



AXIOMTEK

IMB500

**Intel® Socket 1151 6th/7th Gen.
Core™ i7/ i5/ i3 Processors ATX
Industrial Motherboard**

User's Manual



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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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Table of Contents

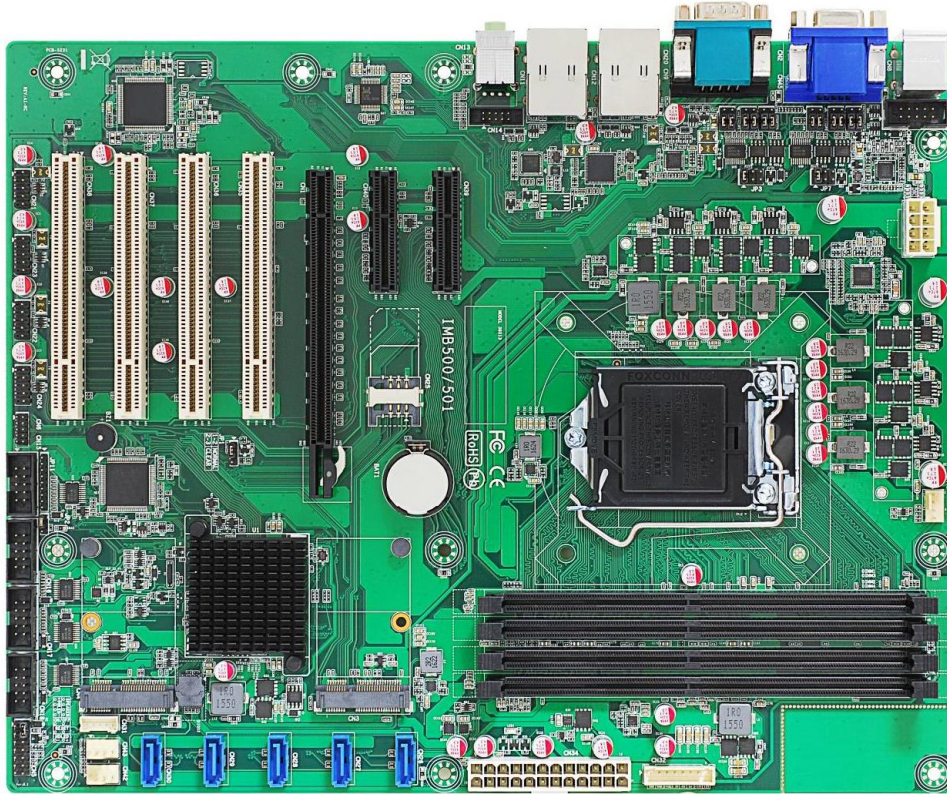
| | |
|---|----------|
| Disclaimers | ii |
| ESD Precautions..... | iii |
| Chapter 1 Introduction..... | 1 |
| 1.1 Features | 2 |
| 1.2 Specifications | 2 |
| Chapter 2 Board and Pin Assignments..... | 5 |
| 2.1 Board Layout..... | 5 |
| 2.2 Rear I/O..... | 6 |
| 2.3 Jumper Settings | 7 |
| 2.3.1 Clear CMOS (JP1) | 8 |
| 2.3.2 AT/ATX Mode Select (JP2)..... | 8 |
| 2.3.3 COM1 Mode Select (JP3, JP5, JP6)..... | 9 |
| 2.3.4 COM1 Data/Power Select (JP4) | 9 |
| 2.3.5 COM2 Mode Select (JP7, JP9, JP10)..... | 9 |
| 2.3.6 COM2 Data/Power Select (JP8) | 9 |
| 2.4 Connectors..... | 10 |
| 2.4.1 DisplayPort Connector (CN2)..... | 11 |
| 2.4.2 PCI-Express Mini Card Connector (CN3) | 11 |
| 2.4.3 mSATA Slot (CN4) | 12 |
| 2.4.4 Front Panel Header (CN5) | 13 |
| 2.4.5 GPIO Header (CN6) | 13 |
| 2.4.6 PS/2 Keyboard and Mouse Connector (CN8) | 14 |
| 2.4.7 COM Connector (CN9)..... | 14 |
| 2.4.8 LAN and USB 3.0 Connectors (CN11 and CN12)..... | 15 |
| 2.4.9 Audio Jack (CN13) | 15 |
| 2.4.10 Front Audio Header (CN14) | 16 |
| 2.4.11 COM Headers (CN15~CN18 and CN44) | 16 |
| 2.4.12 HDMI Connector (CN20) | 17 |
| 2.4.13 Internal USB Headers (CN21~CN24) | 17 |
| 2.4.14 SIM Card Slot (CN25) | 17 |
| 2.4.15 SATA 3.0 Connectors (CN26~CN30) | 18 |
| 2.4.16 SMBus Header (CN31) | 18 |
| 2.4.17 Voltage Monitor Header (CN32) | 18 |
| 2.4.18 Power Input Connectors (CN33 and CN34)..... | 19 |
| 2.4.19 PCI-Express x4 Slots (CN39 and CN40) | 20 |
| 2.4.20 Fan Connectors (CN41~CN43)..... | 21 |
| 2.4.21 VGA Connector (CN45)..... | 21 |
| 2.4.22 DIMM Sockets (DIMM1 ~ DIMM4) | 22 |

| | | |
|-------------------|-------------------------------------|-----------|
| Chapter 3 | Hardware Description | 23 |
| 3.1 | Microprocessors | 23 |
| 3.2 | BIOS..... | 23 |
| 3.3 | System Memory | 23 |
| Chapter 4 | AMI BIOS Setup Utility | 25 |
| 4.1 | Starting | 25 |
| 4.2 | Navigation Keys | 25 |
| 4.3 | Main Menu | 27 |
| 4.4 | Advanced Menu | 28 |
| 4.5 | Chipset Menu | 40 |
| 4.6 | Security Menu | 44 |
| 4.7 | Boot Menu..... | 45 |
| 4.8 | Save & Exit Menu..... | 46 |
| Appendix A | Watchdog Timer..... | 49 |
| B.1 | About Watchdog Timer | 49 |
| B.2 | Sample Program | 49 |
| Appendix B | BIOS Flash Utility | 51 |

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Chapter 1

Introduction



The IMB500 is an advanced ATX industrial motherboard based on the 6th / 7th Generation Intel® Core™ i7/ i5/ i3/ Pentium® and Celeron® processors in LGA1151 Socket with Intel® Q170. The optimized IMB500 is specially designed for better computing and visual performance; ideally used in every major industry for tasks ranging from financial modeling to designing complex buildings and vehicles. With its built-in Intel® HD Graphics , this industrial grade motherboard delivers great 3D visual performance with triple display capability through DisplayPort, HDMI and VGA ports demanded by professional-grade CAD and media/entertainment fields.

In addition, the IMB500 supports Intel® Turbo Boost 2.0 technology, Intel® Hyper-Threading technology, Intel® HD Graphics with DX11 support, 3-D Tri-Gate transistors, 64GB DDR4 2400/2133/1866MHz memory, and PCI-Express 3.0 x16 slot. It also features Intel® Active Management Technology 9.0 (iAMT), SATA RAID, as well as PCI-Express x4 expansion making it ideal for applications with added security features.

1.1 Features

- LGA1151 Socket 6th / 7th Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors
- 4 DDR4 2400/2133/1866MHz DIMM with maximum capacity up to 64GB (max. 16GB per slot)
- DisplayPort, HDMI, and VGA with triple view supported
- 5 SATA-600 RAID 0/1/5/10
- 4 USB 3.0 and 8 USB 2.0 ports
- mSATA supported
- PCI-Express Mini Card

1.2 Specifications

- **CPU**
 - LGA1151 Socket 6th / 7th Generation Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors.
- **Chipset**
 - Intel® Q170.
- **BIOS**
 - AMI BIOS.
- **System Memory**
 - Four 288-pin DIMM sockets.
 - Maximum up to 64GB DDR4 memory (max. 16GB per slot).
 - Support 2400/2133/1866MHz.
- **Onboard Multi I/O**
 - One PS/2 keyboard and mouse.
 - Six serial ports:
 - Four RS-232 (internal box headers).
 - Two RS-232/422/485 (one in rear I/O, and the other in internal box header).
- **USB Interface**
 - Four USB 3.0 ports.
 - Eight USB 2.0 ports.
- **Ethernet**
 - LAN1: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE Boot ROM, iAMT with Intel® i219LM.
 - LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE Boot ROM with Intel® i210AT.
- **Serial ATA**
 - Five SATA-600 with RAID 0/1/5/10.
 - One mSATA.
- **Audio**
 - Realtek ALC662 5.1 channel HDA Codec.
 - Support MIC-in/line-in/line-out.

- **Display**
 - One 15-pin D-Sub as VGA connector. Resolution max. up to 1920x1200 @60Hz.
 - One HDMI 1.4b with resolution max. up to 4096x2160 @24Hz.
 - One DisplayPort with resolution max. up to 4096x2304 @60Hz.
- **Expansion Interface**
 - One PCI-Express x16 slot.
 - Two PCI-Express x4 slots.
 - Four PCI slots.
 - One PCI-Express Mini Card.
 - One SIM card slot.
- **Power Input**
 - One ATX power input connector.
 - One 12V ATX power input connector for CPU Power.
- **Operating Temperature**
 - 0°C ~ 60°C.
- **Storage Temperature**
 - -20°C ~ 75°C.
- **Form Factor**
 - 305 x 244mm.



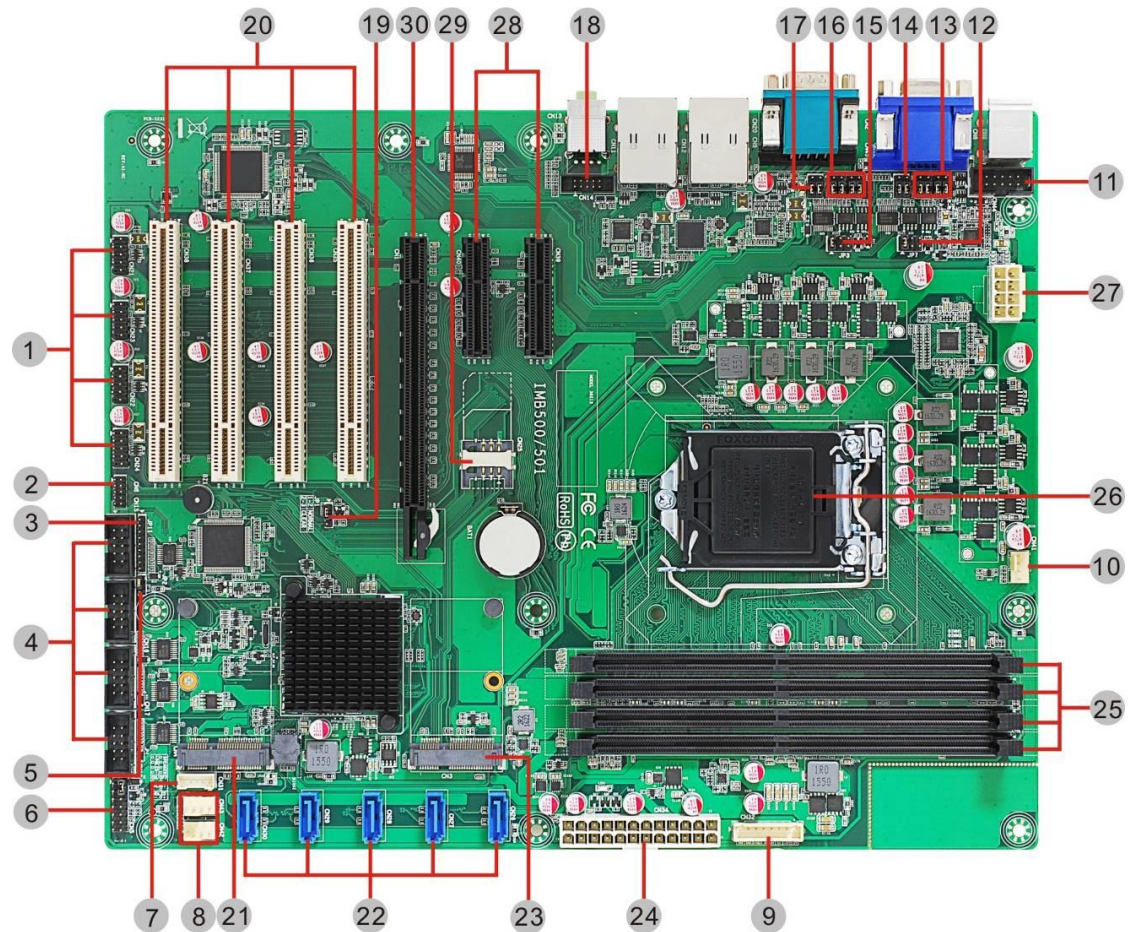
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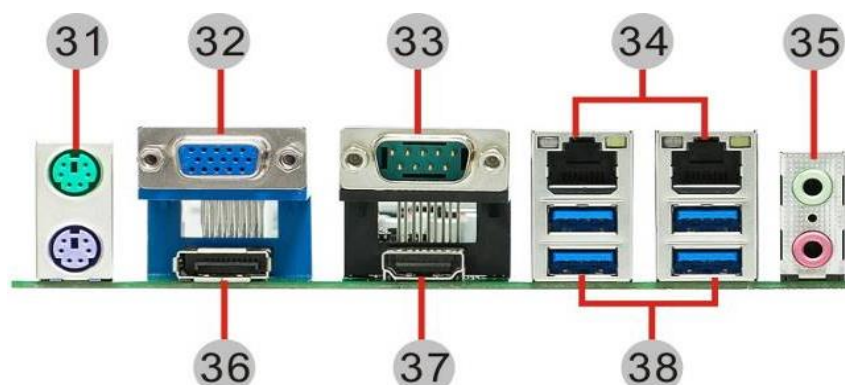
Chapter 2

Board and Pin Assignments

2.1 Board Layout



2.2 Rear I/O



| Jumpers/Headers/Connectors | | | |
|----------------------------|--|----|---|
| 1 | Internal USB Headers (CN21~CN24) | 20 | PCI Slots (CN35~CN38) |
| 2 | GPIO Header (CN6) | 21 | mSATA Slot (CN4) |
| 3 | Debug Header | 22 | SATA 3.0 Connectors (CN26~CN30) |
| 4 | COM3~COM6 Headers (CN15~CN18) | 23 | PCI-Express Mini Card Connector (CN3) |
| 5 | AT/ATX Mode Select Jumper (JP2) | 24 | ATX1 Power Input Connector (CN34) |
| 6 | Front Panel Header (CN5) | 25 | DIMM Sockets (DIMM1~DIMM4) |
| 7 | SMBus Header (CN31) | 26 | CPU Socket |
| 8 | System Fan Connectors (CN42, CN43) | 27 | ATX2 CPU Power Input Connector (CN33) |
| 9 | Voltage Monitor Header (CN32) | 28 | PCI-Express x4 Slots (CN39, CN40) |
| 10 | CPU Fan Connector (CN41) | 29 | SIM Card Slot (CN25) |
| 11 | COM2 Header (CN44) | 30 | PCI-Express x16 Slot (CN1) |
| 12 | COM2 Mode Select Jumper-1 (JP7) | 31 | PS/2 Keyboard and Mouse Connector (CN8) |
| 13 | COM2 Mode Select Jumpers-2 (JP9, JP10) | 32 | VGA Connector (CN45) |
| 14 | COM2 Data/Power Select Jumper (JP8) | 33 | COM Connector (CN9) |
| 15 | COM1 Mode Select Jumper-1 (JP3) | 34 | LAN1 and LAN2 Connectors (CN11, CN12) |
| 16 | COM1 Mode Select Jumpers-2 (JP5, JP6) | 35 | Audio Jack (CN13) |
| 17 | COM1 Data/Power Select Jumper (JP4) | 36 | DisplayPort Connector (CN2) |
| 18 | Front Audio Header (CN14) | 37 | HDMI Connector (CN20) |
| 19 | Clear CMOS Jumper (JP1) | 38 | USB 3.0 Connectors (CN11, CN12) |

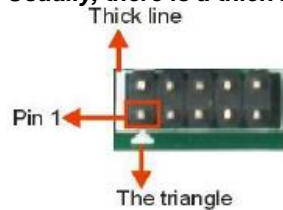


NOTE A direct contact CPU cooler back plate is not available for IMB500.

**Note**

To identify the first pin of a header or jumper, please refer to the following information:

- Usually, there is a thick line or a triangle near the header or jumper pin 1.



- Square pad, which you can find on the back of the motherboard, is usually used for pin 1.



2.3 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.

jumper clip



open



close



pin 1-2 close



all open



Before applying power to IMB500 Series, please make sure all of the jumpers are in factory default position. Below you can find a summary table of all jumpers and onboard default settings.

**Note**

Once the default jumper setting needs to be changed, please do it under power-off condition.

| Jumper | Description | Setting |
|--------|--|----------------|
| JP1 | Clear CMOS Default: Normal Operation | 1-2 Close |
| JP2 | AT/ATX Power Mode Select Default: ATX Mode | 1-2 Close |
| JP3/7 | COM1/2 RS-232/422/485 Mode Select Default: RS-232 | 1-2 Close |
| JP5/9 | | 3-5, 4-6 Close |
| JP6/10 | | 3-5, 4-6 Close |
| JP4/8 | COM1/2 Data/Power Select Default: RS-232 Data | 3-5 Close |
| | | 4-6 Close |

2.3.1 Clear CMOS (JP1)

This jumper (3x1-pin p=2.54mm) allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper clip from pins 1-2 (default) to pins 2-3. Keep the clip on pins 2-3 for about 5~10 seconds, then move the clip back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the key during the boot process and enter BIOS setup to re-enter data.

| Function | Setting |
|----------------------------|-----------|
| Normal operation (Default) | 1-2 close |
| Clear CMOS | 2-3 close |



2.3.2 AT/ATX Mode Select (JP2)

This 3x1-pin p=2.00mm jumper allows you to select AT or ATX power mode.

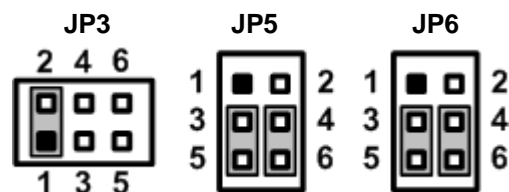
| Function | Setting |
|--------------------|-----------|
| ATX mode (Default) | 1-2 close |
| AT mode | 2-3 close |



2.3.3 COM1 Mode Select (JP3, JP5, JP6)

Use these jumpers (3x2-pin p=2.54mm) to set COM1 port to operate in RS-232, RS-422 or RS-485 communication mode.

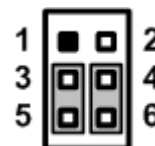
| Function | Setting |
|-----------------------|---|
| RS-232 mode (Default) | JP3 1-2 close JP5 3-5, 4-6 close JP6 3-5, 4-6 close |
| RS-422 mode | JP3 3-4 close JP5 1-3, 2-4 close JP6 1-3, 2-4 close |
| RS-485 mode | JP3 5-6 close JP5 1-3, 2-4 close JP6 1-3, 2-4 close |



2.3.4 COM1 Data/Power Select (JP4)

The COM1 port has +5V power capability on DCD# and +12V on RI# by setting this jumper (3x2-pin p=2.54mm).

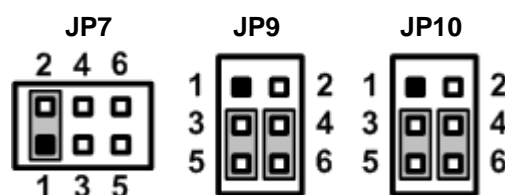
| Function | Setting |
|--|-----------|
| Power: Set COM1 pin 1 to +5V | 1-3 close |
| Data: Set COM1 pin 1 to DCD# (Default) | 3-5 close |
| Power: Set COM1 pin 9 to +12V | 2-4 close |
| Data: Set COM1 pin 9 to RI# (Default) | 4-6 close |



2.3.5 COM2 Mode Select (JP7, JP9, JP10)

Use these jumpers (3x2-pin p=2.54mm) to set COM2 port to operate in RS-232, RS-422 or RS-485 communication mode.

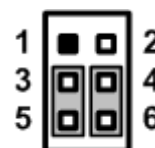
| Function | Setting |
|-----------------------|--|
| RS-232 mode (Default) | JP7 1-2 close JP9 3-5, 4-6 close JP10 3-5, 4-6 close |
| RS-422 mode | JP7 3-4 close JP9 1-3, 2-4 close JP10 1-3, 2-4 close |
| RS-485 mode | JP7 5-6 close |



2.3.6 COM2 Data/Power Select (JP8)

The COM2 port has +5V power capability on DCD# and +12V on RI# by setting this jumper (3x2-pin p=2.54mm).

| Function | Setting |
|--|-----------|
| Power: Set COM2 pin 1 to +5V | 1-3 close |
| Data: Set COM2 pin 1 to DCD# (Default) | 3-5 close |
| Power: Set COM2 pin 8 to +12V | 2-4 close |
| Data: Set COM2 pin 8 to RI# (Default) | 4-6 close |



2.4 Connectors

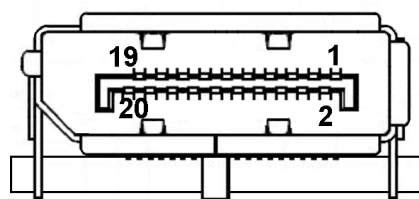
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table showing connectors on the hardware.

| Connector | Description |
|-----------------|-----------------------------------|
| CN1 | PCI-Express x16 Slot |
| CN2 | DisplayPort Connector |
| CN3 | PCI-Express Mini Card Connector |
| CN4 | mSATA Slot |
| CN5 | Front Panel Header |
| CN6 | GPIO Header |
| CN8 | PS/2 Keyboard and Mouse Connector |
| CN9 | COM Connector |
| CN11, CN12 | LAN and USB 3.0 Connectors |
| CN13 | Audio Jack |
| CN14 | Front Audio Header |
| CN15~CN18, CN44 | COM Headers |
| CN20 | HDMI Connector |
| CN21~CN24 | Internal USB Headers |
| CN25 | SIM Card Slot |
| CN26~CN30 | SATA 3.0 Connectors |
| CN31 | SMBus Header |
| CN32 | Voltage Monitor Header |
| CN33 | ATX2 CPU Power Input Connector |
| CN34 | ATX1 24-pin Power Input Connector |
| CN35~CN38 | PCI Slots |
| CN39, CN40 | PCI-Express x4 Slots |
| CN41 | CPU Fan Connector |
| CN42~CN43 | System Fan Connectors |
| CN45 | VGA Connector |

2.4.1 DisplayPort Connector (CN2)

The DisplayPort interface is available through CN2.

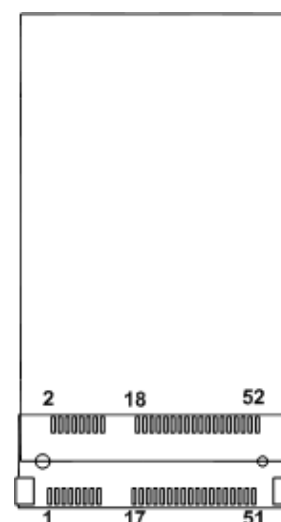
| Pin | Signal | Pin | Signal |
|-----|---------|-----|---------|
| 1 | DP_TX0+ | 2 | GND |
| 3 | DP_TX0- | 4 | DP_TX1+ |
| 5 | GND | 6 | DP_TX1- |
| 7 | DP_TX2+ | 8 | GND |
| 9 | DP_TX2- | 10 | DP_TX3+ |
| 11 | GND | 12 | DP_TX3- |
| 13 | GND | 14 | GND |
| 15 | DP_AUX+ | 16 | GND |
| 17 | DP_AUX- | 18 | DP_HPD |
| 19 | GND | 20 | +3.3V |



2.4.2 PCI-Express Mini Card Connector (CN3)

The CN3 complies with PCI-Express Mini Card Spec. V1.2.

| Pin | Signal | Pin | Signal |
|-----|----------------|-----|-----------------|
| 1 | PCH_WAKE_N | 2 | +3.3V_DUAL |
| 3 | N/C | 4 | GND |
| 5 | N/C | 6 | +1.5V |
| 7 | +3.3V_DUAL | 8 | UIM_PWR |
| 9 | GND | 10 | UIM_DAT |
| 11 | CLKOUT_PCIE_N3 | 12 | UIM_CLK |
| 13 | CLKOUT_PCIE_P3 | 14 | UIM_RST |
| 15 | GND | 16 | UIM_VPP |
| 17 | N/C | 18 | GND |
| 19 | N/C | 20 | RF_KILL#_WIFI |
| 21 | GND | 22 | BUF_PLT_RST_N |
| 23 | PCIE7_RX_DN | 24 | +3.3V_DUAL |
| 25 | PCIE7_RX_DP | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK_RESUME |
| 31 | PCIE7_TX_DN | 32 | SMB_DATA_RESUME |
| 33 | PCIE7_TX_DP | 34 | GND |
| 35 | GND | 36 | USB10- |
| 37 | GND | 38 | USB10+ |
| 39 | +3.3V_DUAL | 40 | GND |
| 41 | +3.3V_DUAL | 42 | N/C |
| 43 | GND | 44 | N/C |
| 45 | CL_CLK | 46 | N/C |
| 47 | CL_DATA | 48 | +1.5V |
| 49 | CL_RST_N | 50 | GND |
| 51 | N/C | 52 | +3.3V_DUAL |

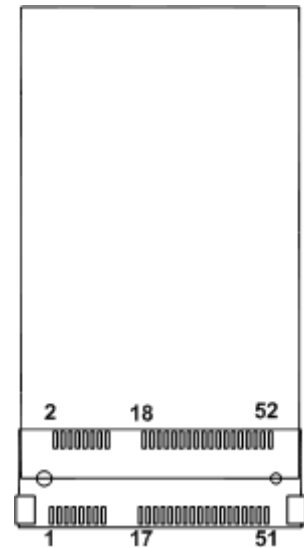


Note

*Screw type is M2*0.4.*

2.4.3 mSATA Slot (CN4)

| Pin | Signal | Pin | Signal |
|-----|-------------|-----|-----------------|
| 1 | N/C | 2 | +3.3V_DUAL |
| 3 | N/C | 4 | GND |
| 5 | N/C | 6 | +1.5V |
| 7 | N/C | 8 | N/C |
| 9 | GND | 10 | N/C |
| 11 | N/C | 12 | N/C |
| 13 | N/C | 14 | N/C |
| 15 | GND | 16 | N/C |
| 17 | N/C | 18 | GND |
| 19 | N/C | 20 | N/C |
| 21 | GND | 22 | BUF_PLT_RST_N |
| 23 | SATA0_RX_DP | 24 | +3.3V_DUAL |
| 25 | SATA0_RX_DN | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK_RESUME |
| 31 | SATA0_TX_DN | 32 | SMB_DATA_RESUME |
| 33 | SATA0_TX_DP | 34 | GND |
| 35 | GND | 36 | USB9- |
| 37 | GND | 38 | USB9+ |
| 39 | +3.3V_DUAL | 40 | GND |
| 41 | +3.3V_DUAL | 42 | N/C |
| 43 | GND | 44 | N/C |
| 45 | N/C | 46 | N/C |
| 47 | N/C | 48 | +1.5V |
| 49 | N/C | 50 | GND |
| 51 | N/C | 52 | +3.3V_DUAL |



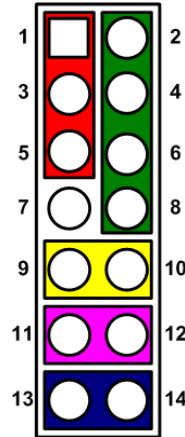
Note

Screw type is M2*0.4.

2.4.4 Front Panel Header (CN5)

This is front panel header (7x2-pin p=2.54mm).

| Pin | Signal |
|-----|---------------------|
| 1 | Power LED+ |
| 2 | SPK- ^[1] |
| 3 | GND |
| 4 | BUZZER |
| 5 | Power LED- |
| 6 | N/C |
| 7 | N/C |
| 8 | SPK+ ^[1] |
| 9 | PWR- |
| 10 | PWR+ |
| 11 | RESET- |
| 12 | RESET+ |
| 13 | HD LED- |
| 14 | HD LED+ |



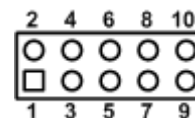
Note

^[1]: The buzzer on motherboard will be active when pin 2 and pin 4 is connected; the external speaker on chassis will be active when pin 2 and pin 4 is open.

2.4.5 GPIO Header (CN6)

This header (5x2-pin p=2.00mm) is for digital I/O interface.

| Pin | Signal | Pin | Signal |
|-----|---|-----|------------------------------|
| 1 | SIO_GPO74 (0xA06 Bit4, H) ^[1] | 2 | SIO_GPO70 (0xA06 Bit0, H) |
| 3 | SIO_GPO75 (0xA06 Bit5, H) | 4 | SIO_GPO71 (0xA06 Bit1, H) |
| 5 | SIO_GPO76 (0xA06 Bit6, H) | 6 | SIO_GPO72 (0xA06 Bit2, H) |
| 7 | SIO_GPO77 (0xA06 Bit7, H) | 8 | SIO_GPO73 (0xA06 Bit3, H) |
| 9 | GND | 10 | GND |



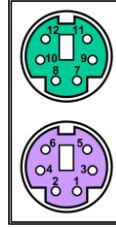
Note

^[1]: “H” or “L” means the default voltage is High or Low level, and GPIO output is 5V. The GPI or GPO and High or Low level can be selected with BIOS setting.

2.4.6 PS/2 Keyboard and Mouse Connector (CN8)

The motherboard has two 6-pin mini-DIN PS/2 connectors on the rear I/O; green for mouse and purple for keyboard.

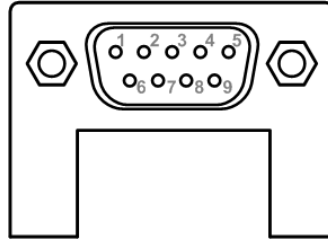
| Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|
| 1 | KB_DT1 | 7 | MS_DT1 |
| 2 | N/C | 8 | N/C |
| 3 | GND | 9 | GND |
| 4 | +5V_DUAL | 10 | +5V_DUAL |
| 5 | KB_CK1 | 11 | MS_CK1 |
| 6 | N/C | 12 | N/C |



2.4.7 COM Connector (CN9)

This is a high rise 9-pin D-Sub connector for COM1 serial port interface. The pin assignments of RS-232/422/485 are listed in table below.

| Pin | RS-232 ^[*] | RS-422 ^[*] | RS-485 ^[*] |
|-----|-----------------------|-----------------------|-----------------------|
| 1 | DCD# ^[**] | TX- | 485- |
| 2 | RXD | TX+ | 485+ |
| 3 | TXD | RX+ | N/C |
| 4 | DTR# | RX- | N/C |
| 5 | GND | GND | GND |
| 6 | DSR# | N/C | N/C |
| 7 | RTS# | N/C | N/C |
| 8 | CTS# | N/C | N/C |
| 9 | RI# ^[**] | N/C | N/C |



Note

^[*]: Signals of COM1 can be RS-232/422/485 by selecting JP3, JP5 and JP6 (see section 2.3.3).

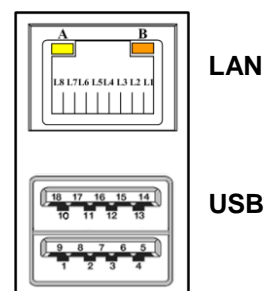
^[**]: Pin 1 of COM1 can be DCD/+5V and pin 9 of COM1 can be RI/+12V by selecting JP4 (see section 2.3.4).

2.4.8 LAN and USB 3.0 Connectors (CN11 and CN12)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10 Base-T hub.

The Universal Serial Bus (compliant with USB 3.0) connectors on the rear I/O are for installing USB peripherals such as keyboard, mouse, scanner, etc.

| Pin | LAN Signal | Pin | LAN Signal |
|-----|----------------------------------|-----|----------------------------------|
| L1 | Tx+ (Data transmission positive) | L2 | Tx- (Data transmission negative) |
| L3 | Rx+ (Data reception positive) | L4 | RJ-1 (For 1000 Base-T only) |
| L5 | RJ-1 (For 1000 Base-T only) | L6 | Rx- (Data reception negative) |
| L7 | RJ-1 (For 1000 Base-T only) | L8 | RJ-1 (For 1000 Base-T only) |
| A | Active LED | B | Speed LED |



Note

- **Speed LED turns orange for 1000Mbps or green for 100Mbps. The light is off for 10Mbps.**
- **CN11 supports AMT when chipset is customized into Intel® Q170. Both CN11 and CN12 support Wake-on-LAN.**

| Pin | USB Signal | Pin | USB Signal |
|-----|------------|-----|------------|
| 1 | USB3_POWER | 2 | USB - |
| 3 | USB + | 4 | GND |
| 5 | USB3_SSRX | 6 | USB3_SSRX+ |
| 7 | GND | 8 | USB3_SSTX |
| 9 | USB3_SSTX+ | | |

2.4.9 Audio Jack (CN13)

The motherboard provides HD audio jack on the rear I/O. Install audio driver, and then attach audio devices to CN13.

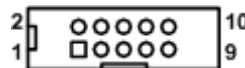
| Pin Color | Signal |
|-----------|----------|
| Green | Line-out |
| Pink | MIC-in |



2.4.10 Front Audio Header (CN14)

This is front audio header (5x2-pin p=2.00mm) for convenient connection and control of audio devices.

| Pin | Signal | Pin | Signal |
|-----|-----------|-----|--------|
| 1 | MIC_IN | 2 | GND |
| 3 | LINE_IN_L | 4 | GND |
| 5 | LINE_IN_R | 6 | GND |
| 7 | AUD_OUT_L | 8 | GND |
| 9 | AUD_OUT_R | 10 | GND |



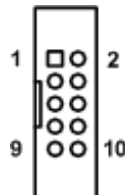
2.4.11 COM Headers (CN15~CN18 and CN44)

The motherboard comes with 5x2-pin p=2.54mm headers for COM3~COM6 and COM2 serial port interfaces.

COM3~COM6:

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | DCD# | 2 | DSR# |
| 3 | RXD# | 4 | RTS# |
| 5 | TXD# | 6 | CTS# |
| 7 | DTR# | 8 | RI# |
| 9 | GND | 10 | N/C |

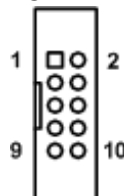
CN15~CN18



COM2:

| Pin | Signal | Pin | Signal |
|-----|---------------------|-----|--------------------|
| 1 | DCD# ^[1] | 2 | DSR# |
| 3 | RXD | 4 | RTS# |
| 5 | TXD | 6 | CTS# |
| 7 | DTR# | 8 | RI# ^[1] |
| 9 | GND | 10 | N/C |

CN44



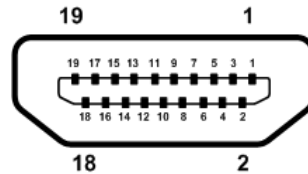
Note

^[1]: Pin 1 of COM2 can be DCD/+5V and pin 8 of COM2 can be RI/+12V by selecting JP8 (see section 2.3.6).

2.4.12 HDMI Connector (CN20)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

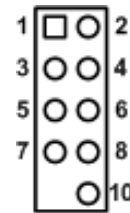
| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | DATA2+ | 2 | GND |
| 3 | DATA2- | 4 | DATA1+ |
| 5 | GND | 6 | DATA1- |
| 7 | DATA0+ | 8 | GND |
| 9 | DATA0- | 10 | Clock+ |
| 11 | GND | 12 | Clock- |
| 13 | N/C | 14 | GND |
| 15 | SCL | 16 | SDA |
| 17 | GND | 18 | +5V |
| 19 | HPD | | |



2.4.13 Internal USB Headers (CN21~CN24)

These are 5x2-pin p=2.54mm headers for USB 2.0 interface.

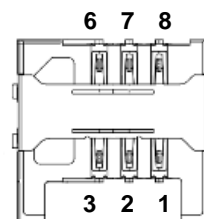
| Pin | CN21/22/23/24 | Pin | CN21/22/23/24 |
|-----|---------------|-----|---------------|
| 1 | +5 V_DUAL | 2 | +5 V_DUAL |
| 3 | USB5/7/11/13- | 4 | USB6/8/12/14- |
| 5 | USB5/7/11/13+ | 6 | USB6/8/12/14+ |
| 7 | GND | 8 | GND |
| | | 10 | N/C |



2.4.14 SIM Card Slot (CN25)

The CN25 is for inserting SIM Card.

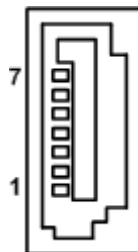
| Pin | Signal | Pin | Signal |
|-----|----------|-----|---------|
| 1 | PWR_UIM | 6 | DAT_UIM |
| 2 | REST_UIM | 7 | VPP_UIM |
| 3 | CLK_UIM | 8 | GND |



2.4.15 SATA 3.0 Connectors (CN26~CN30)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to devices such as hard disk drive.

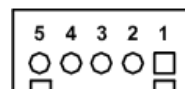
| Pin | Signal |
|-----|----------|
| 1 | GND |
| 2 | SATA_TX+ |
| 3 | SATA_TX- |
| 4 | GND |
| 5 | SATA_RX- |
| 6 | SATA_RX+ |
| 7 | GND |



2.4.16 SMBus Header (CN31)

The CN31 (5x1-pin p=2.00mm) is for SMBus (System Management Bus) interface.

| Pin | Signal | Pin | Signal |
|-----|---------|-----|---------|
| 1 | SMB_SCL | 2 | N/C |
| 3 | GND | 4 | SMB_SDA |
| 5 | +5V | | |



2.4.17 Voltage Monitor Header (CN32)

The CN32 (8x1-pin p=2.54mm) is for voltage monitoring only. It doesn't supply power.

| Pin | Signal | Pin | Signal |
|-----|---------|-----|--------|
| 1 | GND | 2 | GND |
| 3 | VCC5_SB | 4 | +3.3V |
| 5 | -5V | 6 | +5V |
| 7 | -12V | 8 | +12V |



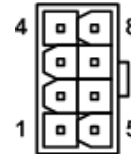
2.4.18 Power Input Connectors (CN33 and CN34)

Steady and sufficient power can be supplied to all components on the motherboard by connecting power connector. Please make sure all components and devices are properly installed before connecting the power connector.

External power supply plug fits into this connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

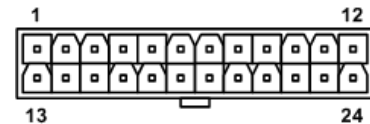
ATX2 CPU power input connector:

| Pin | CN33 Signal | Pin | CN33 Signal |
|-----|-------------|-----|-------------|
| 1 | GND | 5 | +12V |
| 2 | GND | 6 | +12V |
| 3 | GND | 7 | +12V |
| 4 | GND | 8 | +12V |



ATX1 24-pin power input connector:

| Pin | CN34 Signal | Pin | CN34 Signal |
|-----|-------------|-----|-------------|
| 1 | 3.3V | 13 | 3.3V |
| 2 | 3.3V | 14 | -12V |
| 3 | GND | 15 | GND |
| 4 | +5V | 16 | PS_ON |
| 5 | GND | 17 | GND |
| 6 | +5V | 18 | GND |
| 7 | GND | 19 | GND |
| 8 | PWR OK | 20 | -5V |
| 9 | 5VSB | 21 | +5V |
| 10 | +12V | 22 | +5V |
| 11 | +12V | 23 | +5V |
| 12 | 3.3V | 24 | GND |



2.4.19 PCI-Express x4 Slots (CN39 and CN40)

This motherboard has two PCI-Express x4 slots.

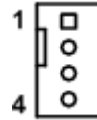
| Pin | Signal | Pin | Signal |
|-----|------------------------|-----|---------------------|
| B1 | +12V_PS | A1 | GND |
| B2 | +12V_PS | A2 | +12V_PS |
| B3 | +12V_PS | A3 | +12V_PS |
| B4 | GND | A4 | GND |
| B5 | SMB_CLK_RESUME | A5 | N/C |
| B6 | SMB_DATA_RESUME | A6 | N/C |
| B7 | GND | A7 | N/C |
| B8 | +3.3V_PS | A8 | N/C |
| B9 | N/C | A9 | +3.3V_PS |
| B10 | +3.3V_SB | A10 | +3.3V_PS |
| B11 | PCH_WAKE_N | A11 | PWRGD |
| B12 | N/C | A12 | GND |
| B13 | GND | A13 | CLKOUT_PCIE_P5 |
| B14 | PCIE1_SLOT1_TX_DP_C | A14 | CLKOUT_PCIE_N5 |
| B15 | PCIE1_SLOT1_TX_DN_C | A15 | GND |
| B16 | GND | A16 | PCIE1_SLOT1_RX_DP_C |
| B17 | PCIEX4_SLOT1_PRSENT2_N | A17 | PCIE1_SLOT1_RX_DN_C |
| B18 | GND | A18 | GND |
| B19 | PCIE2_TX_DP | A19 | N/C |
| B20 | PCIE2_TX_DN | A20 | GND |
| B21 | GND | A21 | PCIE2_RX_DP |
| B22 | GND | A22 | PCIE2_RX_DN |
| B23 | PCIE3_TX_DP | A23 | GND |
| B24 | PCIE3_TX_DN | A24 | GND |
| B25 | GND | A25 | PCIE3_RX_DP |
| B26 | GND | A26 | PCIE3_RX_DN |
| B27 | PCIE4_TX_DP | A27 | GND |
| B28 | PCIE4_TX_DN | A28 | GND |
| B29 | GND | A29 | PCIE4_RX_DP |
| B30 | N/C | A30 | PCIE4_RX_DN |
| B31 | N/C | A31 | GND |
| B32 | GND | A32 | N/C |

2.4.20 Fan Connectors (CN41~CN43)

This motherboard has three fan connectors. Find fan speed option(s) at BIOS Setup Utility: Advanced\HW Monitor\PC Health Status.

The CN41 (4x1-pin p=2.54mm) is for CPU fan connector.

| Pin | Signal |
|-----|---------------------|
| 1 | GND |
| 2 | +12V |
| 3 | FAN Speed Detection |
| 4 | FAN Speed Control |



The CN42 and CN43 (4x1-pin p=2.54mm) are for system fan connectors.

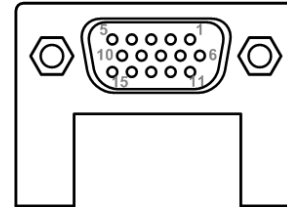
| Pin | Signal |
|-----|---------------------|
| 1 | GND |
| 2 | +12V |
| 3 | FAN Speed Detection |
| 4 | FAN Speed Control |



2.4.21 VGA Connector (CN45)

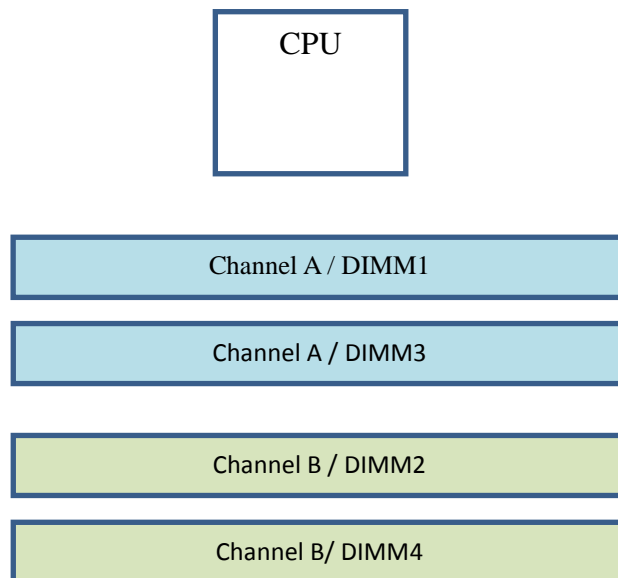
This is a high rise 15-pin D-Sub connector which is commonly used for VGA display. This VGA interface configuration can be configured via software utility.

| Pin | Signal | Pin | Signal |
|-----|-----------------|-----|---------------|
| 1 | Red | 2 | Green |
| 3 | Blue | 4 | NC |
| 5 | GND | 6 | DETECT |
| 7 | GND | 8 | GND |
| 9 | VCC | 10 | GND |
| 11 | NC | 12 | DDC DATA |
| 13 | Horizontal Sync | 14 | Vertical Sync |
| 15 | DDC CLK | | |



2.4.22 DIMM Sockets (DIMM1 ~ DIMM4)

There are four DDR4 DIMM sockets. They are grouped into two memory channels, channel A and channel B. DIMM sockets are arranged in the order as the following diagram.



Chapter 3

Hardware Description

3.1 Microprocessors

The IMB500 Series supports Intel® Core™ i7/ i5/ i3, Pentium® and Celeron® processors, which enable your system to operate under Windows® 7 32/64-bit, Windows® 8.1, Windows® 10 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

3.2 BIOS

The IMB500 Series uses AMI Plug and Play BIOS.

3.3 System Memory

The IMB500 supports four 288-pin DDR4 DIMM sockets for maximum memory capacity up to 64GB DDR4 SDRAMs. The memory module comes in sizes of 2GB, 4GB, 8GB and 16GB.

Up to this document edited, 6th Intel® Core™ i CPU's support DDR4 2133/1866, and 7th Intel® Core™ i CPU's support DDR4 2400/2133. This is subject to Intel®'s change. Users are recommended to check Intel®'s web for the most updated information.

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Chapter 4

AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.



Note

If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP1 (see section 2.3.1).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.



Note

Some of the navigation keys differ from one screen to another.

| Hot Keys | Description |
|---------------|---|
| →← Left/Right | The Left and Right <Arrow> keys allow you to select a setup screen. |
| ↑↓ Up/Down | The Up and Down <Arrow> keys allow you to select a setup screen or sub screen. |
| Enter | The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub screens. |
| +– Plus/Minus | The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item. |
| F1 | The <F1> key allows you to display the General Help screen. |
| F2 | The <F2> key allows you to Load Previous Values. |
| F3 | The <F3> key allows you to Load Optimized Defaults. |
| F4 | The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes. |
| Esc | The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes. |

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



BIOS Information

Display the BIOS information.

System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Access Level

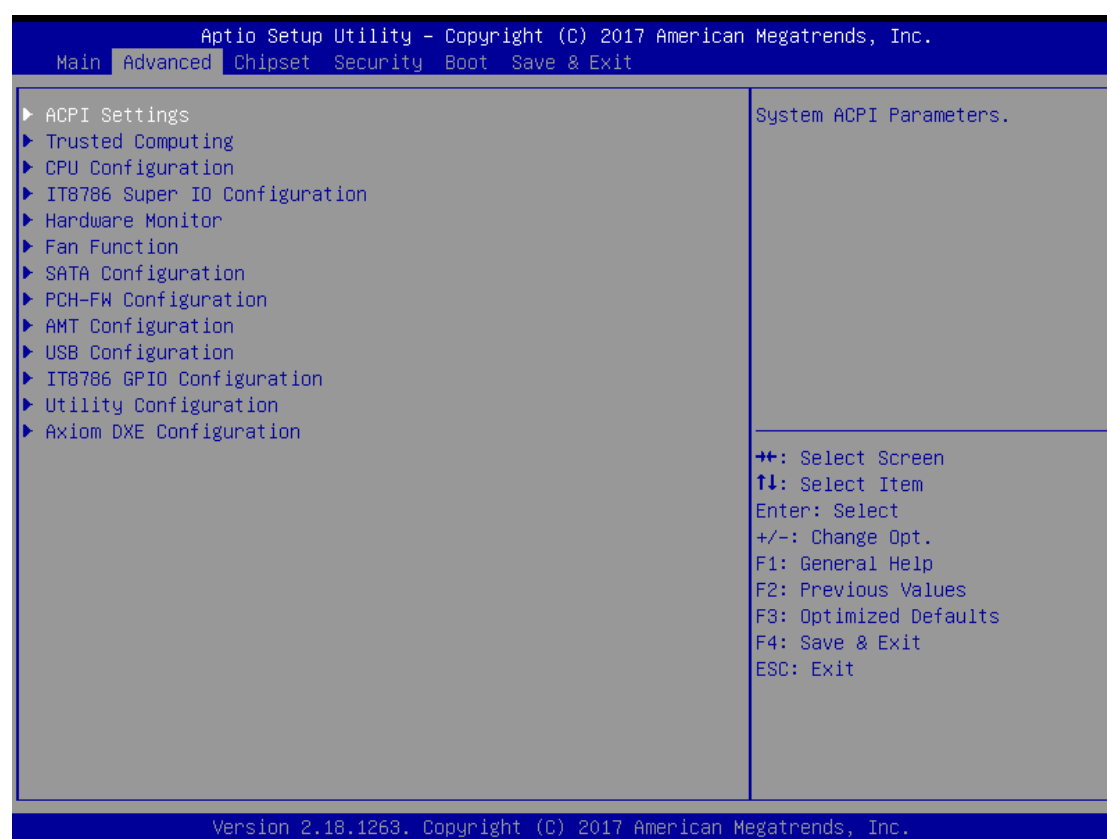
Display the access level of current user.

4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

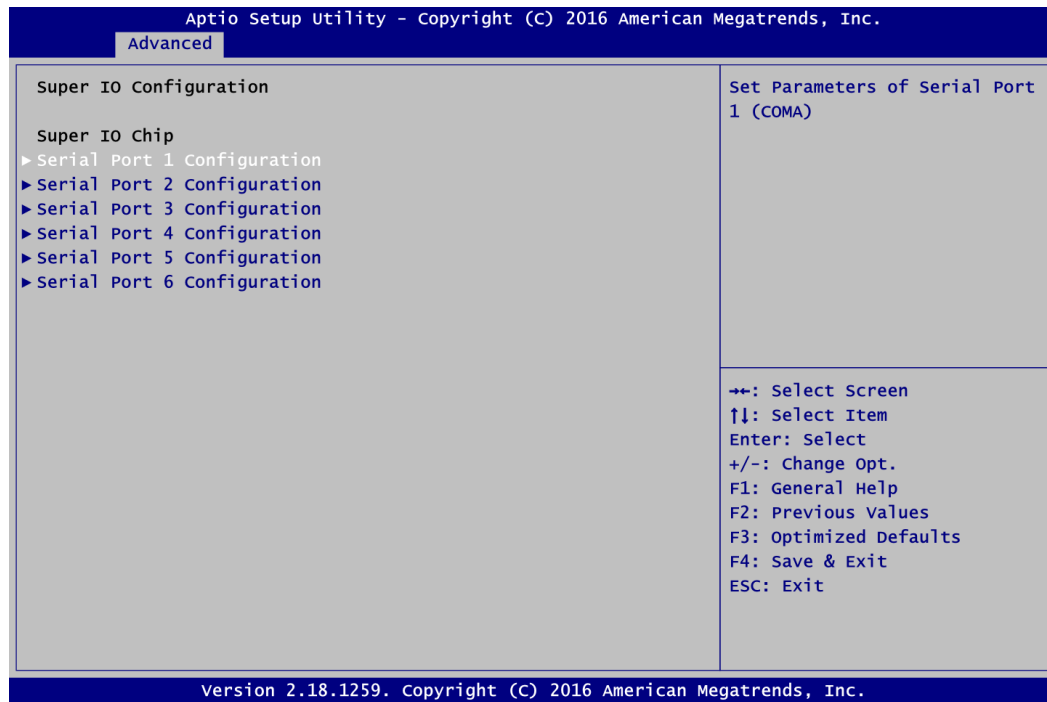
- ▶ Super IO Configuration
- ▶ Hardware Monitor
- ▶ Fan Function
- ▶ ACPI Settings
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ SATA And RST Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration
- ▶ USB Configuration
- ▶ IT8786 GPIO Configuration
- ▶ Utility Configuration

For items marked with “▶”, please press <Enter> for more options.



- **Super IO Configuration**

You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.

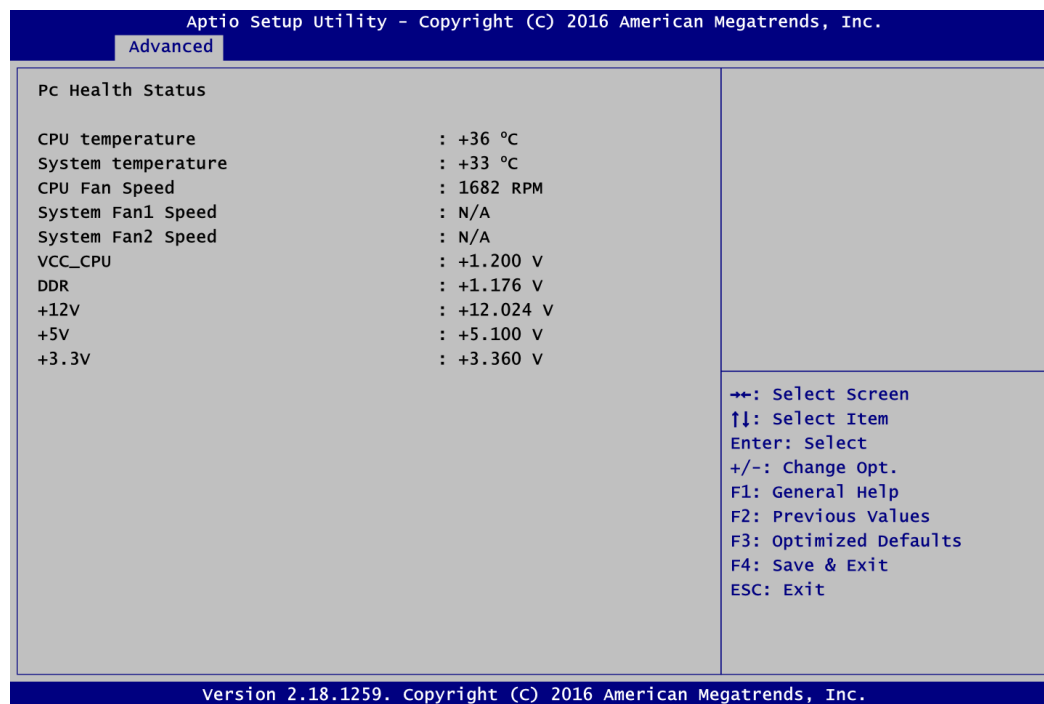


Serial Port 1~6 Configuration

Use these items to set parameters related to serial port 1~6.

- **Hardware Monitor**

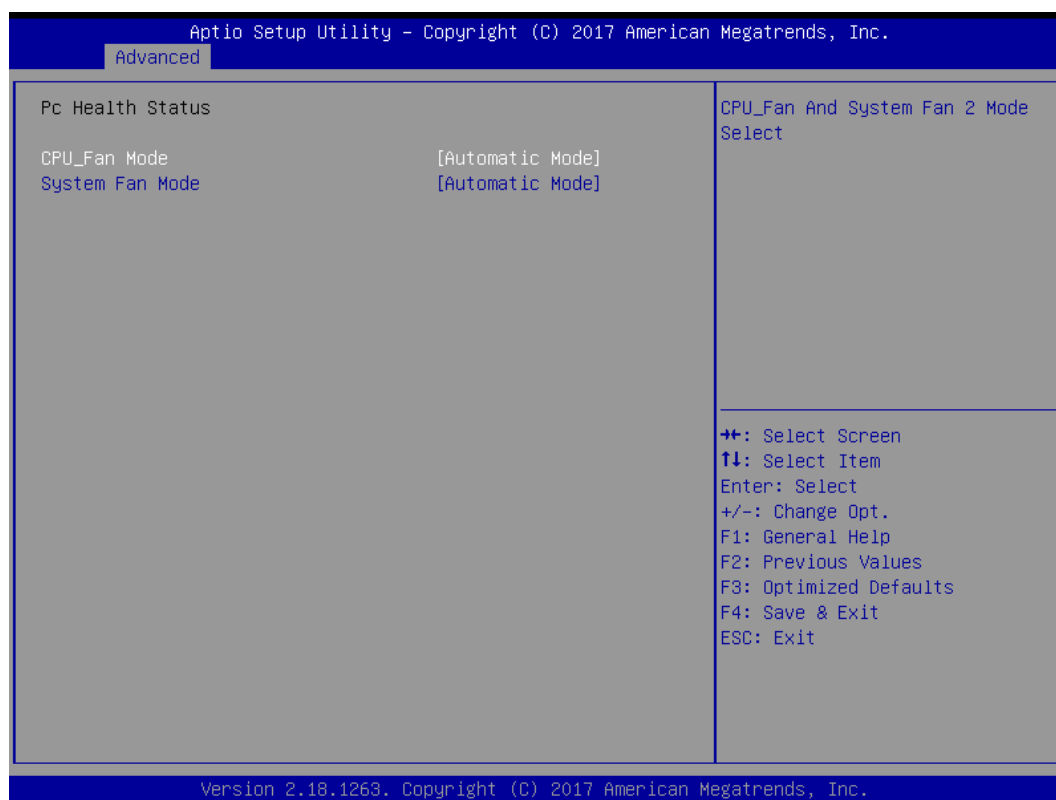
This screen monitors hardware health status.



This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCC_CPU, DDR, +12V, +5V and +3.3V).

- **Fan Function**

This screen allows you to select CPU and system fan mode.

**CPU_Fan/System Fan**

These items allow you to select CPU and system fans mode, which can be set to Full on, Manual and Automatic Mode.

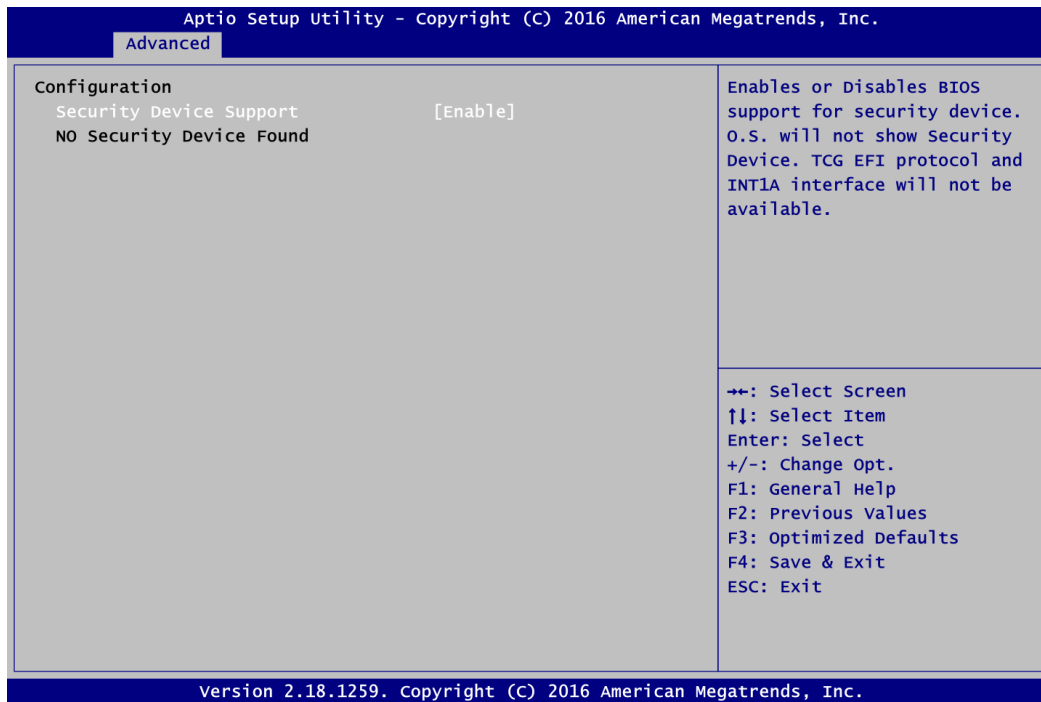
- **ACPI Settings**

**ACPI Sleep State**

Select the ACPI (Advanced Configuration and Power Interface) sleep state. Configuration options are Suspend Disabled and S3 (Suspend to RAM). The default is S3 (Suspend to RAM); this option selects ACPI sleep state the system will enter when suspend button is pressed.

- **Trusted Computing**

You can use this screen for TPM (Trusted Platform Module) configuration. It also shows current TPM status information.

**Security Device Support**

Enable or disable BIOS support for security device.

- **CPU Configuration**

This screen shows CPU information, and you can change the value of the selected option.

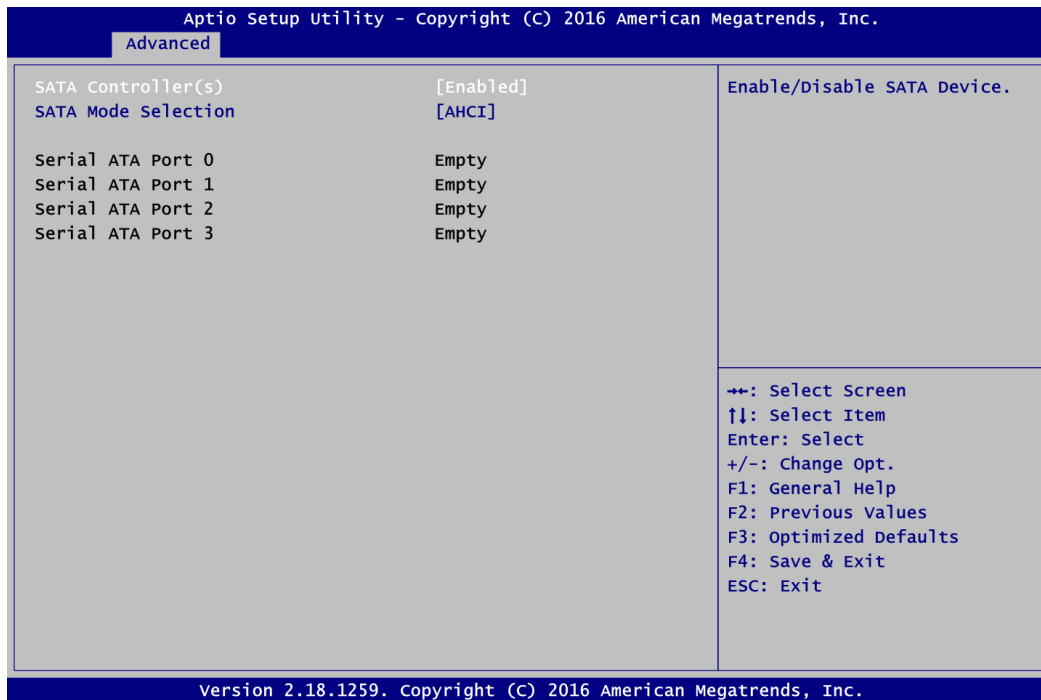


Intel Virtualization Technology

Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

- **SATA and RST Configuration**

During system boot up, the BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see the currently installed hardware in the SATA ports.

**SATA Controller(s)**

Enable or disable the SATA Controller feature. The default is Enabled.

SATA Mode Selection

Determine how SATA controller(s) operate. Operation mode options are IDE and AHCI (Advanced Host Controller Interface) Mode. The default is AHCI Mode.

- **PCH-FW Configuration**

This screen displays ME Firmware information.

| Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc. | |
|---|---------------|
| Advanced | |
| ME Firmware Version | 11.0.0.1197 |
| ME Firmware Mode | Normal Mode |
| ME Firmware SKU | Corporate SKU |
| | |
| ↔: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit | |
| Version 2.18.1259. Copyright (C) 2016 American Megatrends, Inc. | |

- **AMT Configuration**

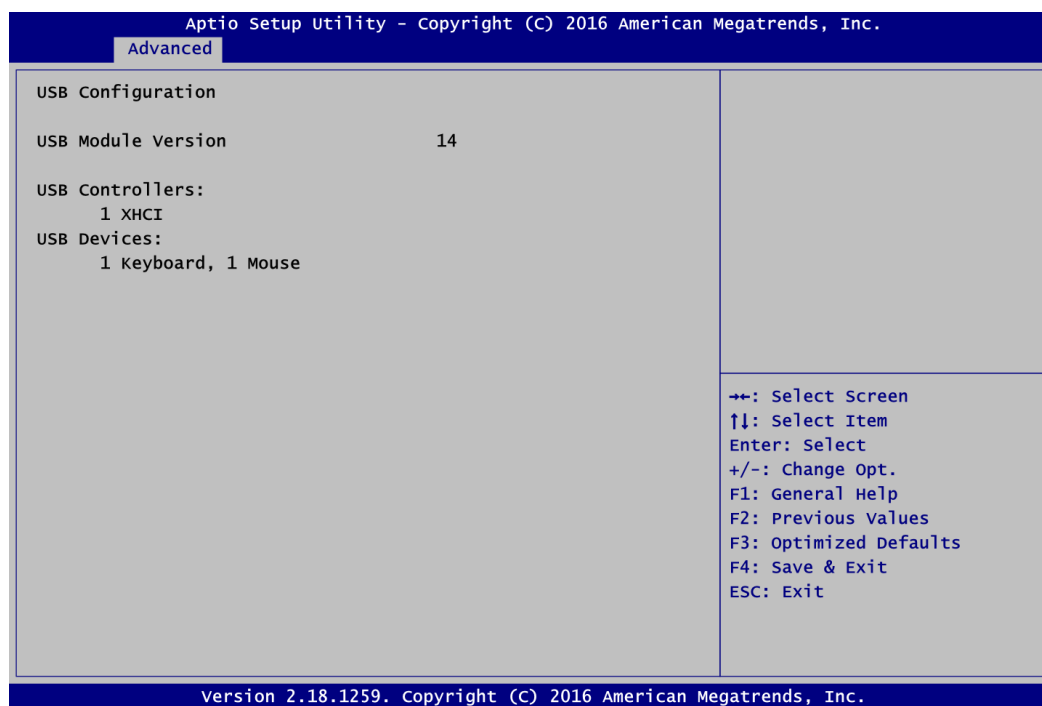
Use this screen to configure AMT parameters.

| Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc. | |
|---|-----------|
| Advanced | |
| AMT BIOS Features | [Enabled] |
| | |
| When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW. | |
| ↔: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit | |
| Version 2.18.1259. Copyright (C) 2016 American Megatrends, Inc. | |

AMT BIOS Features

Enable or disable Active Management Technology BIOS features. The default is Enabled.

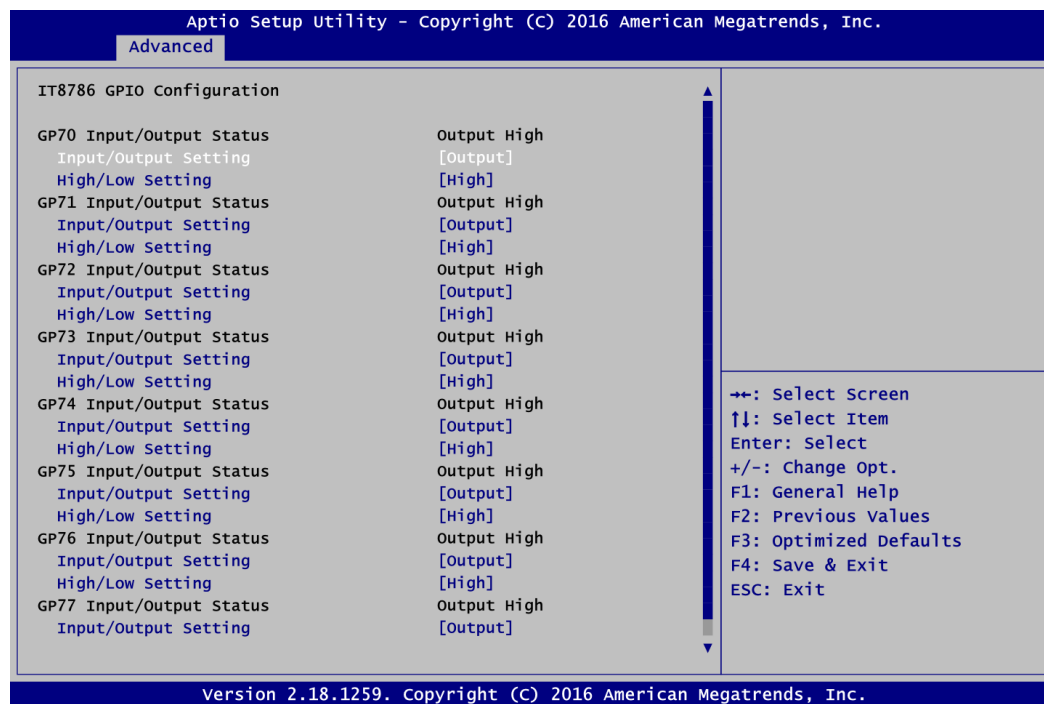
- **USB Configuration**

**USB Devices**

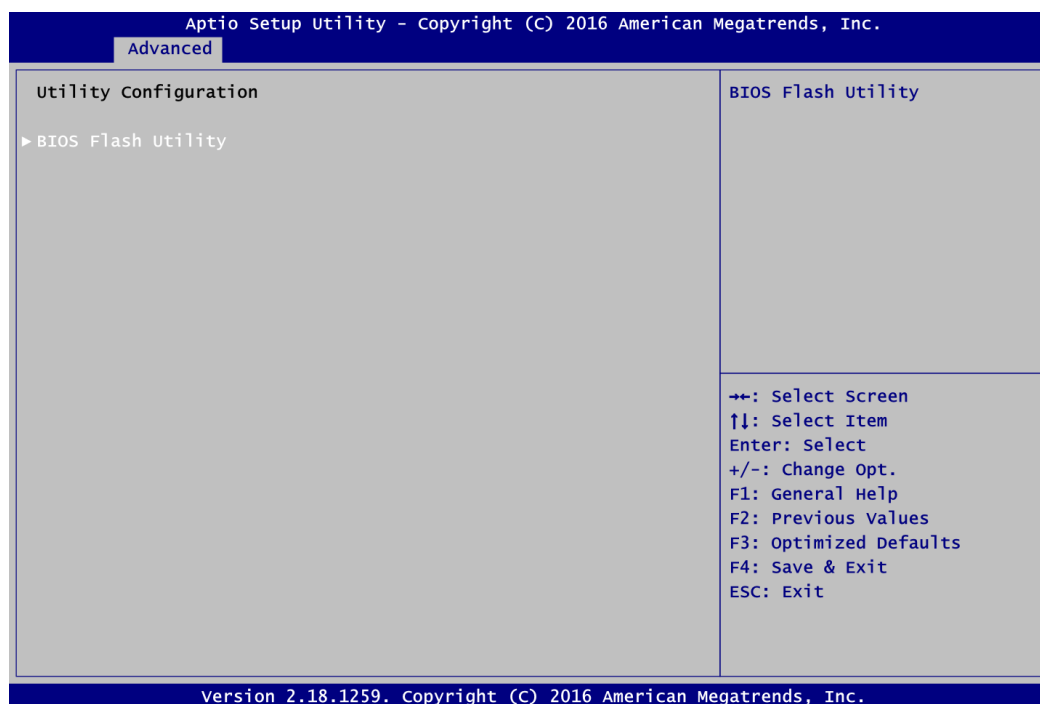
Display all detected USB devices.

- **IT8786 GPIO Configuration**

You can use this screen to set input/output and high/low for each port.



- **Utility Configuration**

**BIOS Flash Utility**

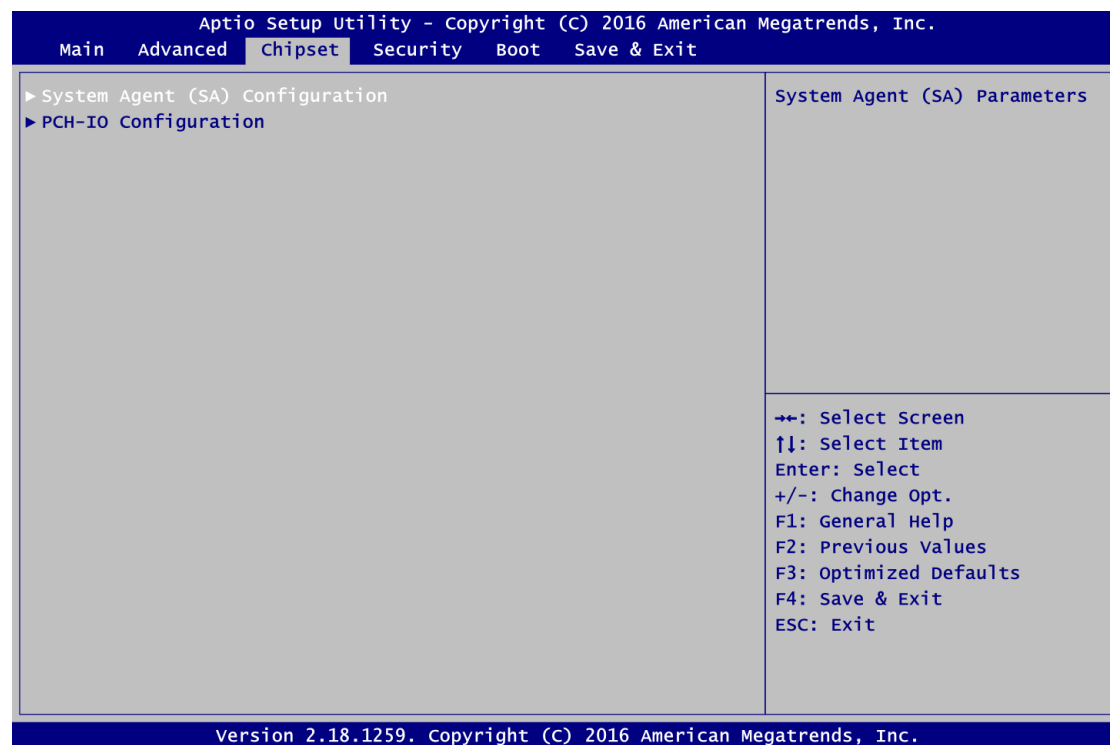
BIOS flash utility configuration. For more detailed information, please refer to Appendix B.

4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration

For items marked with “▶”, please press <Enter> for more options.



- **System Agent (SA) Configuration**

This screen allows users to configure System Agent (SA) parameters. For items marked with “▶”, please press <Enter> for more options.

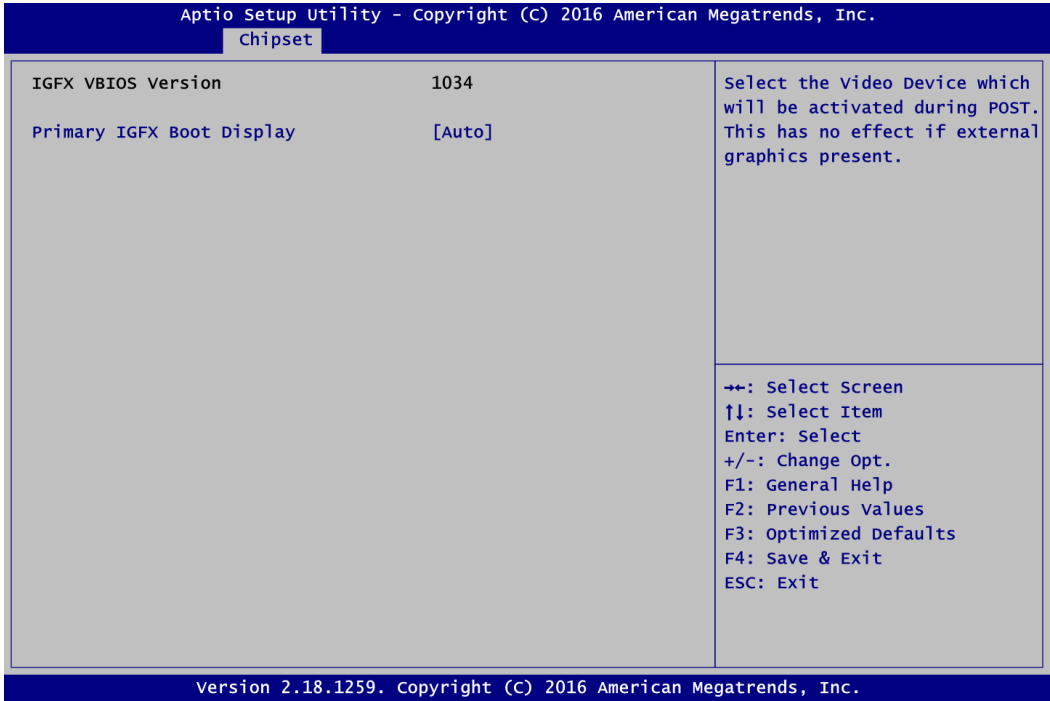
**Graphics Configuration**

Open sub menu for parameters related to graphics configuration.

Memory Configuration

Open sub menu for information related to system memory.

● Graphics Configuration



Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self Test). The default is Auto.

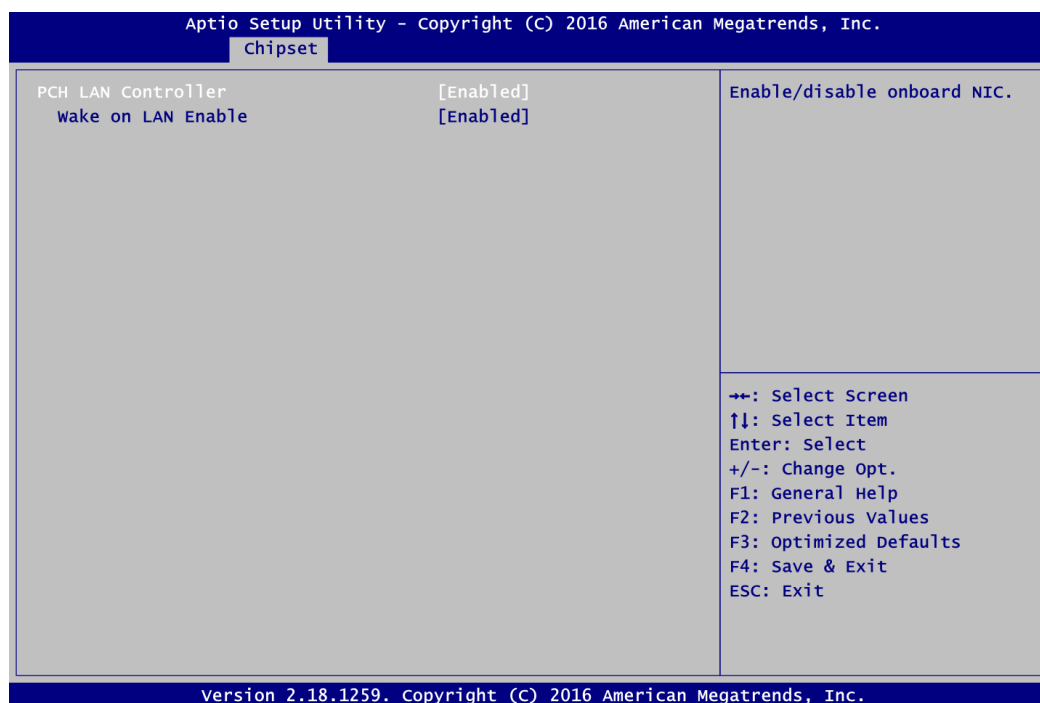
- **Memory Configuration**

This screen shows system memory information.



- **PCH-IO Configuration**

This screen allows you to set PCH parameters.



PCH LAN Controller

Enable or disable onboard PCH LAN controller.

Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

4.6 Security Menu

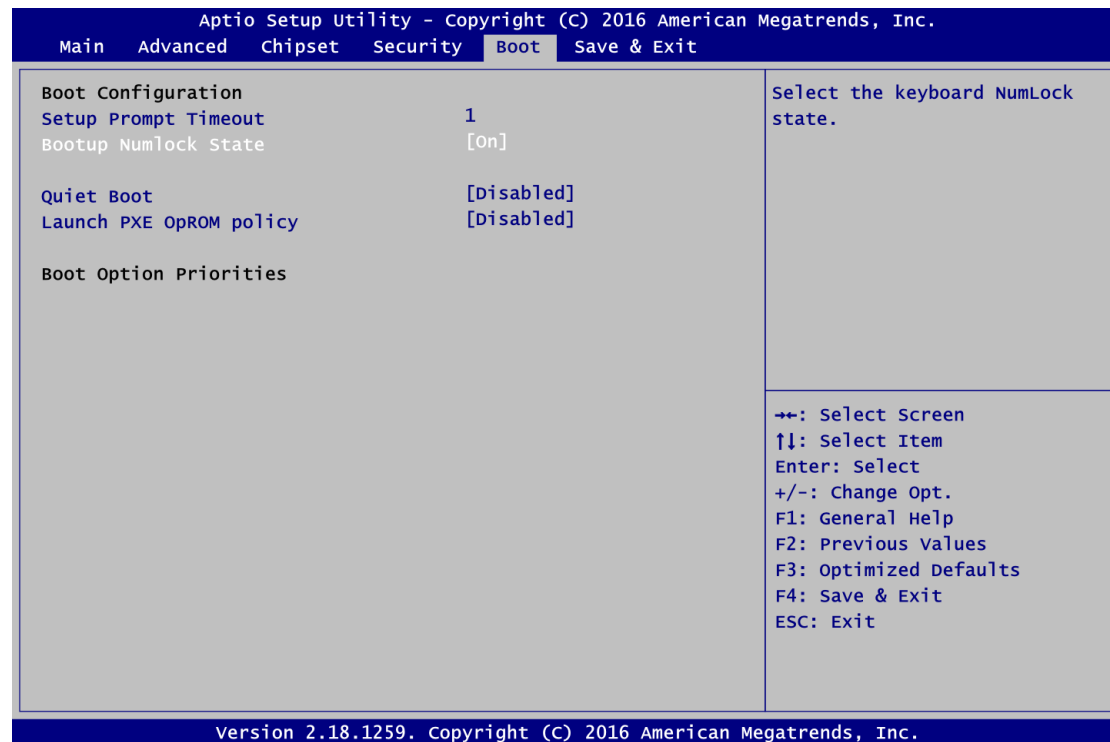
The Security menu allows users to change the security settings for the system.



- **Administrator Password**
This item indicates whether an administrator password has been set (installed or uninstalled).
- **User Password**
This item indicates whether a user password has been set (installed or uninstalled).

4.7 Boot Menu

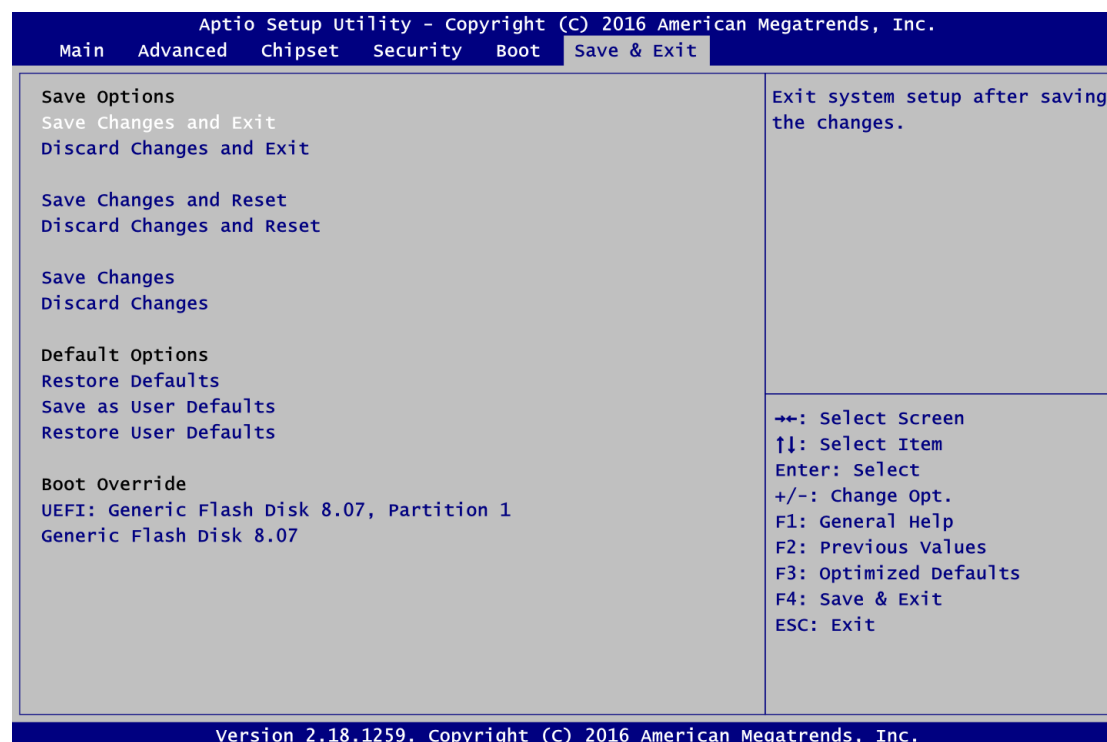
The Boot menu allows users to change boot options of the system.



- Setup Prompt Timeout**
 Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- Bootup NumLock State**
 Use this item to select the power-on state for the keyboard NumLock.
- Quiet Boot**
 Select to display either POST output messages or a splash screen during boot-up.
- Launch PXE OpROM policy**
 Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.
- Boot Option Priorities**
 These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- Save Changes and Exit**
 When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.
- Discard Changes and Exit**
 Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.
- Save Changes and Reset**
 When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.
- Discard Changes and Reset**
 Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.
- Save Changes**
 When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

- **Discard Changes**
Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.
- **Restore Defaults**
It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.
- **Save as User Defaults**
Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.
- **Restore User Defaults**
It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.
- **Boot Override**
Select a drive to immediately boot that device regardless of the current boot order.

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Appendix A

Watchdog Timer

B.1 About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

B.2 Sample Program

1. Enter **ADU**, and press <F4> to select the **superior ITE**
2. **PORT** setting **002E**, **002F**
3. Address **07h** setting **07 GPIO**
4. Address **72h** to set the countdown, for example Sec: **C0**, Min: **40**
5. Address **73h** set the countdown time, for example 10sec: **0A**

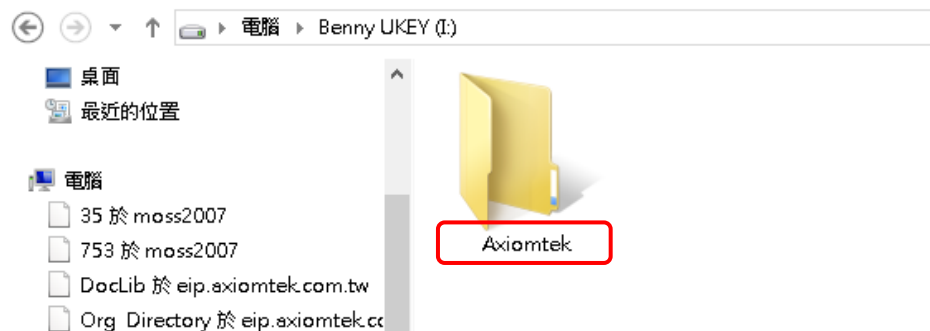
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Appendix B

BIOS Flash Utility

The BIOS Flash utility is a new helpful function in BIOS setup program. With this function you can easily update system BIOS without having to enter operating system. In this appendix you may learn how to do it in just a few steps. Please read and follow the instructions below carefully.

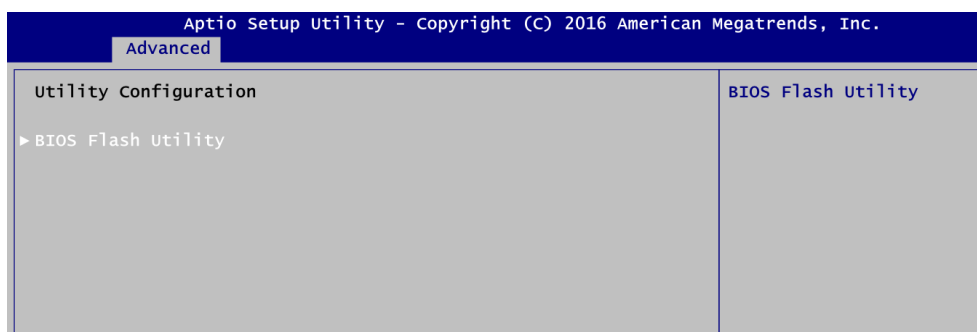
1. In your USB flash drive, create a new folder and name it “Axiomtek”, see figure below.



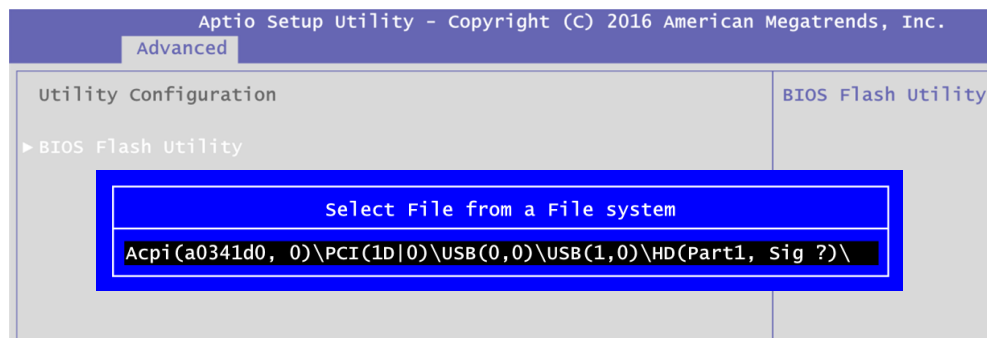
2. Copy BIOS ROM file (e.g. IMB500.005) to “Axiomtek” folder.



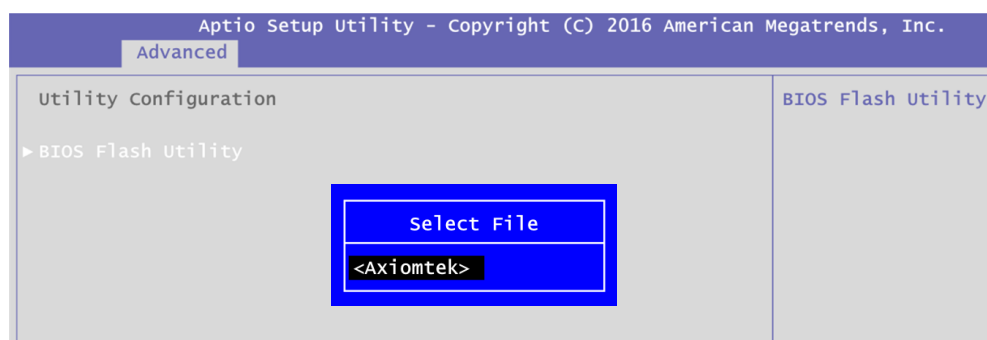
3. Insert the USB flash drive to your system.
4. Enter BIOS setup menu and go to Advanced\Utility Configuration. Select BIOS Flash Utility and press <Enter>.



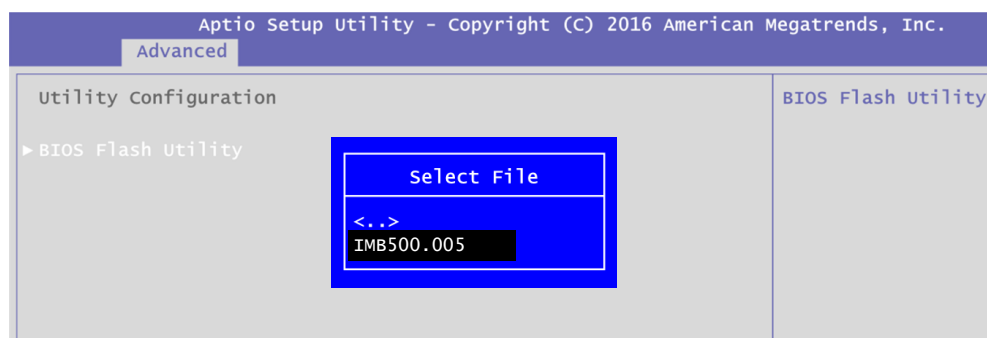
- BIOS automatically detect all USB drive(s) attached to the system. In this example only one USB drive is attached to the system. That's why, you can see only one device is displayed in figure below.



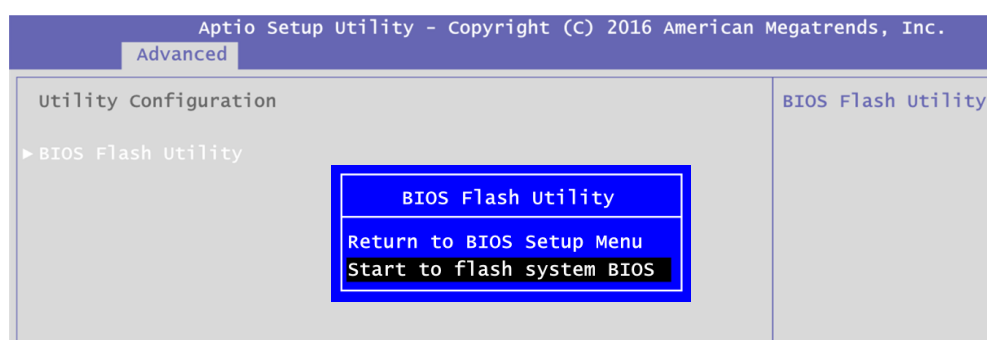
- Select the USB drive containing BIOS ROM file you want to update using the <↑> or <↓> key. Then press <Enter> to get into "Axiomtek" folder.



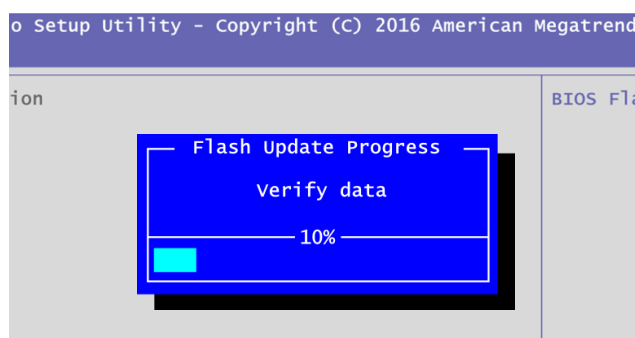
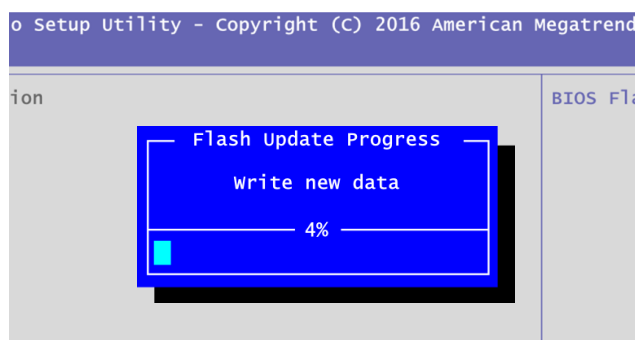
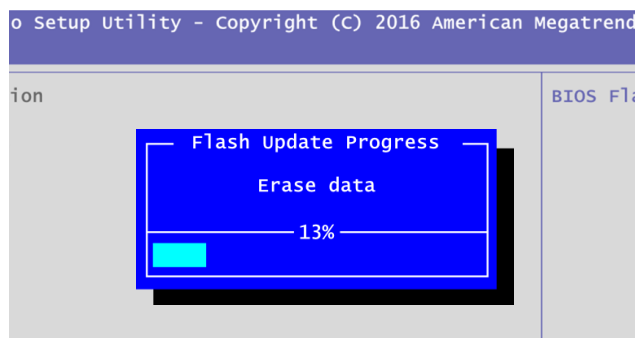
- Now you can see the BIOS ROM file on the screen, press <Enter> to select.



- Select Start to flash system BIOS option to begin updating procedure.



9. Please wait while BIOS completes the entire flash update process: erase data, write new data and verify data.



10. When you see the following figure, press <Enter> to finish the update process. After that the system will shut down and restart immediately.

